

Diadema



DIADEMA

A "keystone" species of Caribbean reefs

- Grazing
- Bioerosion
 - Bioerosion produces sediments.
 - Grazing "cleans" sediments.

PROJECT FOCUS

EFFECTS OF DIADEMA ON THE SEDIMENT TRANSPORT AND BEDLOAD REGIME

- Sedimentation and sediment transport are not synonymous.
 - Sedimentation: "vertical fallout" of sediments
 - Sediment transport: horizontal movement of sediments
 - Contention: sediment transport >>> sedimentation
- Direct and indirect linkages between sediment transport and various biological, physical and chemical processes in coral reefs. Relationships between sediment transport and:
 - smothering of sessile biota (biological)
 - water motion, substrate slope and topographic relief (physical)
 - consolidated vs. unconsolidated sediments (physical)
 - sediment consolidation by microflora (biological)
 - nutrient regimes in cleaned/uncleaned sediments and microfloral populations (chemical)

Ecological effects of sediment transport: Supporting evidence

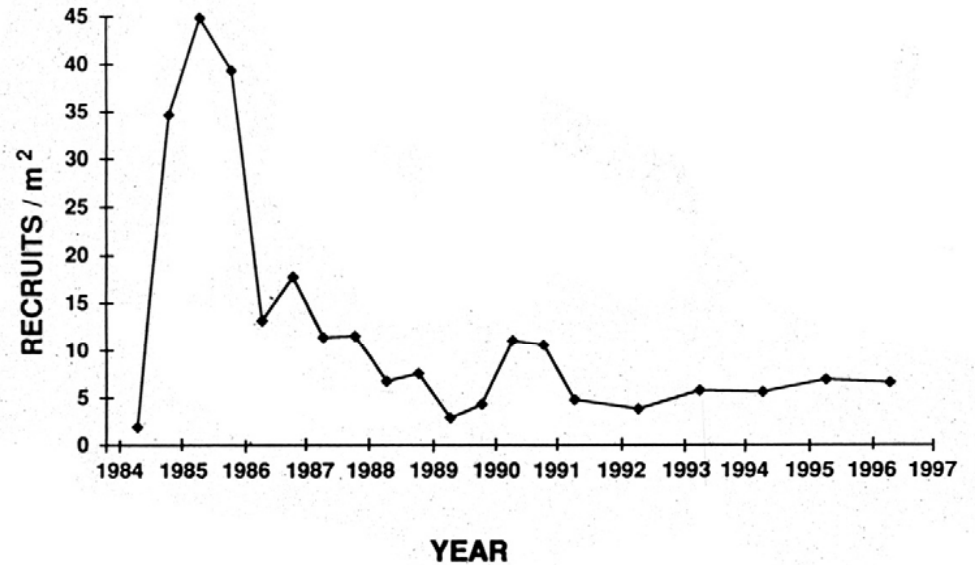
Sediment transport is a major factor affecting the species composition of gorgonian communities.

Colony height (not surface area, diameter, etc.) is the major size-specific effect increasing the survivorship of gorgonians.

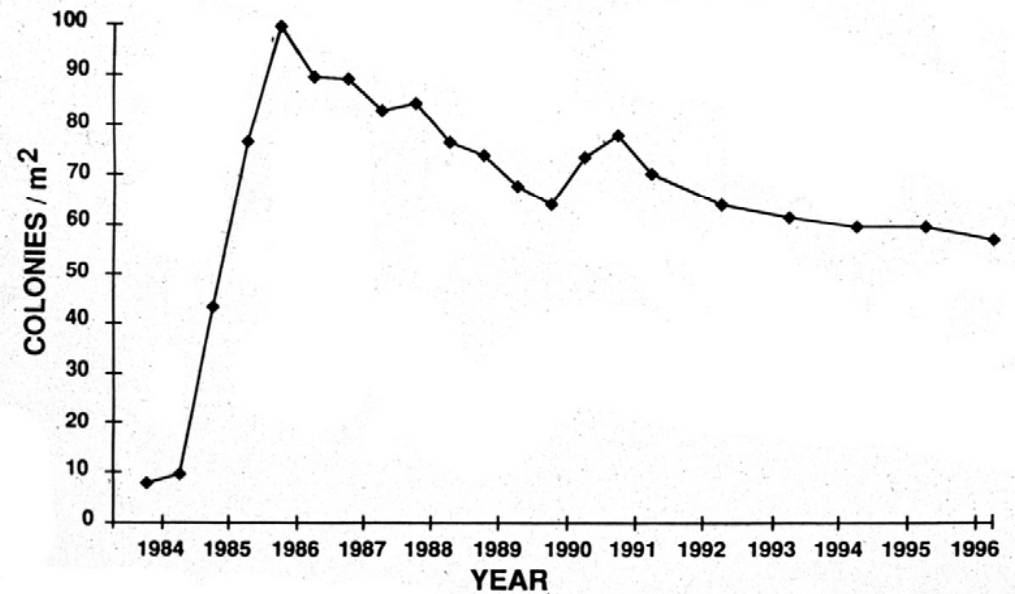
Height-specific survivorships may be responsible for the poor development of scleractinian coral reefs in 'hard ground' habitats.

Effects of the *Diadema* mass mortality on the sediment transport

RECRUITMENT



TOTAL COLONY DENSITY

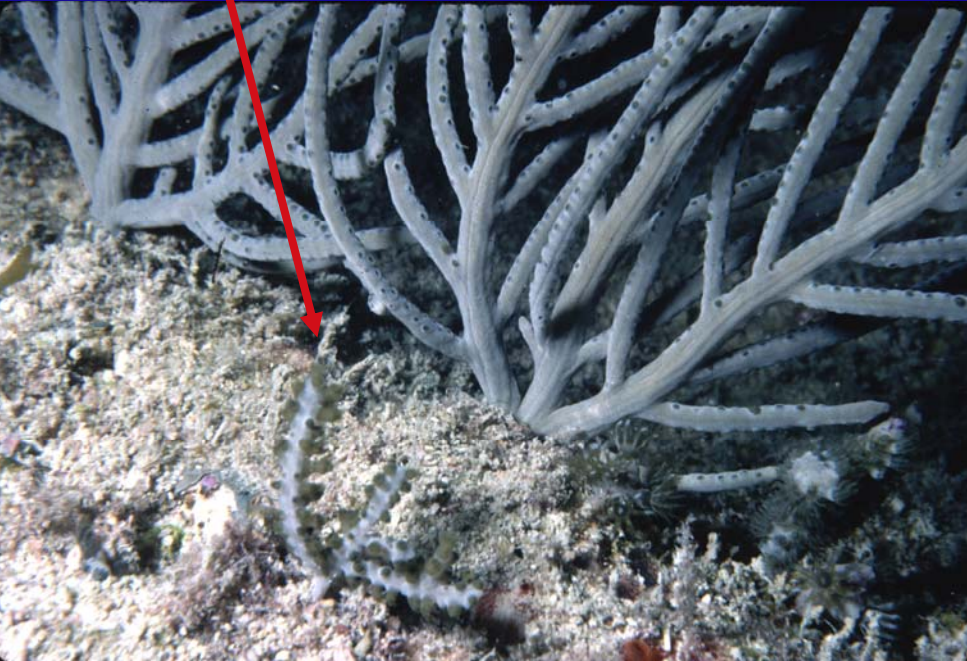


Branch/Colony Thickness

Thin branched

Pseudopterogorgia spp.

Gorgonia ventalina



Medium thickness

Muricea spp.



Branch/Colony Thickness

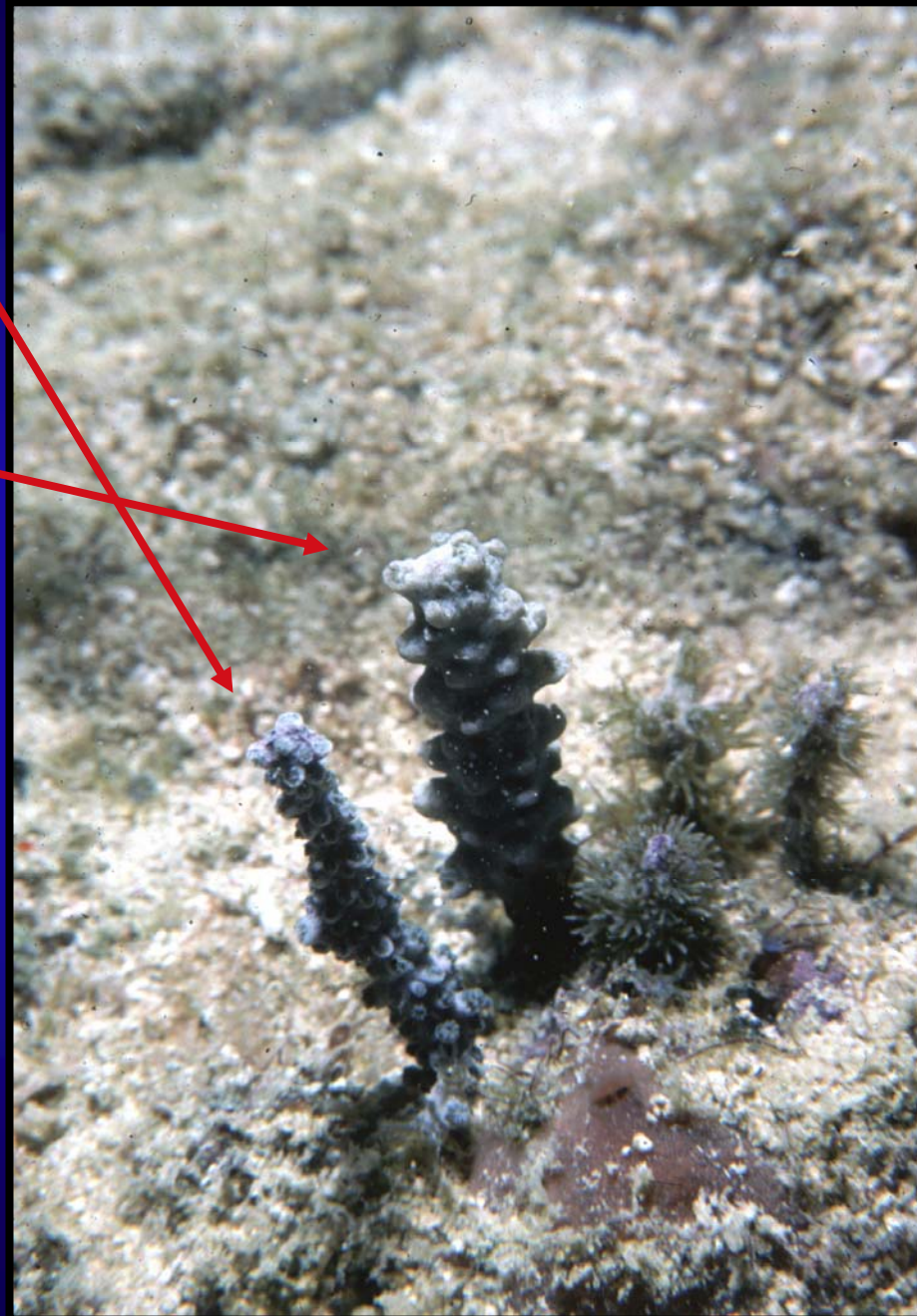
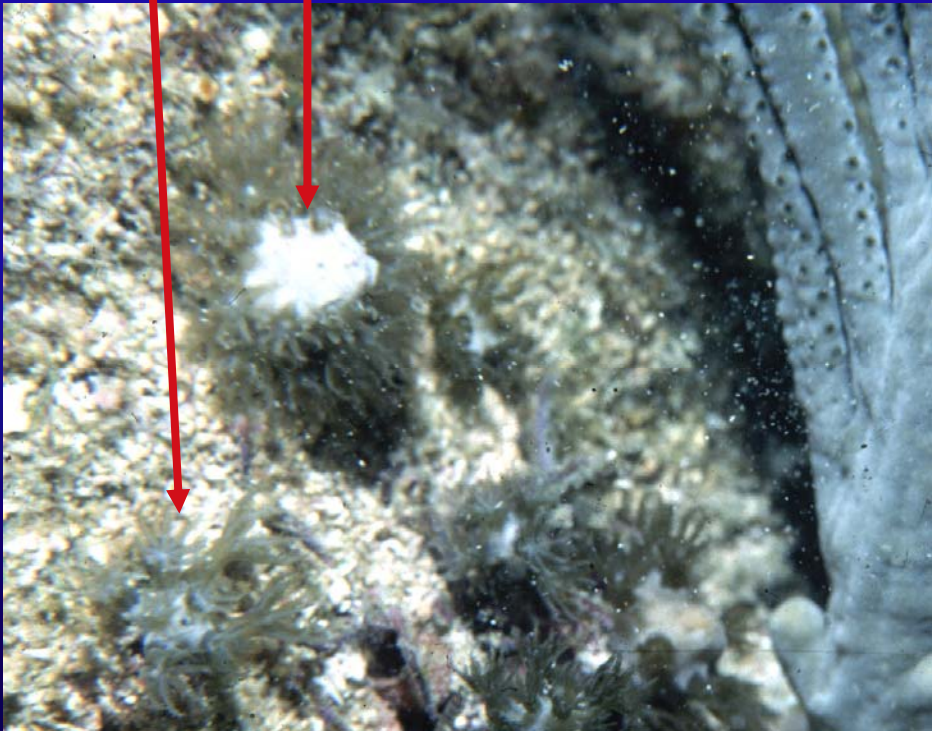
Medium thickness

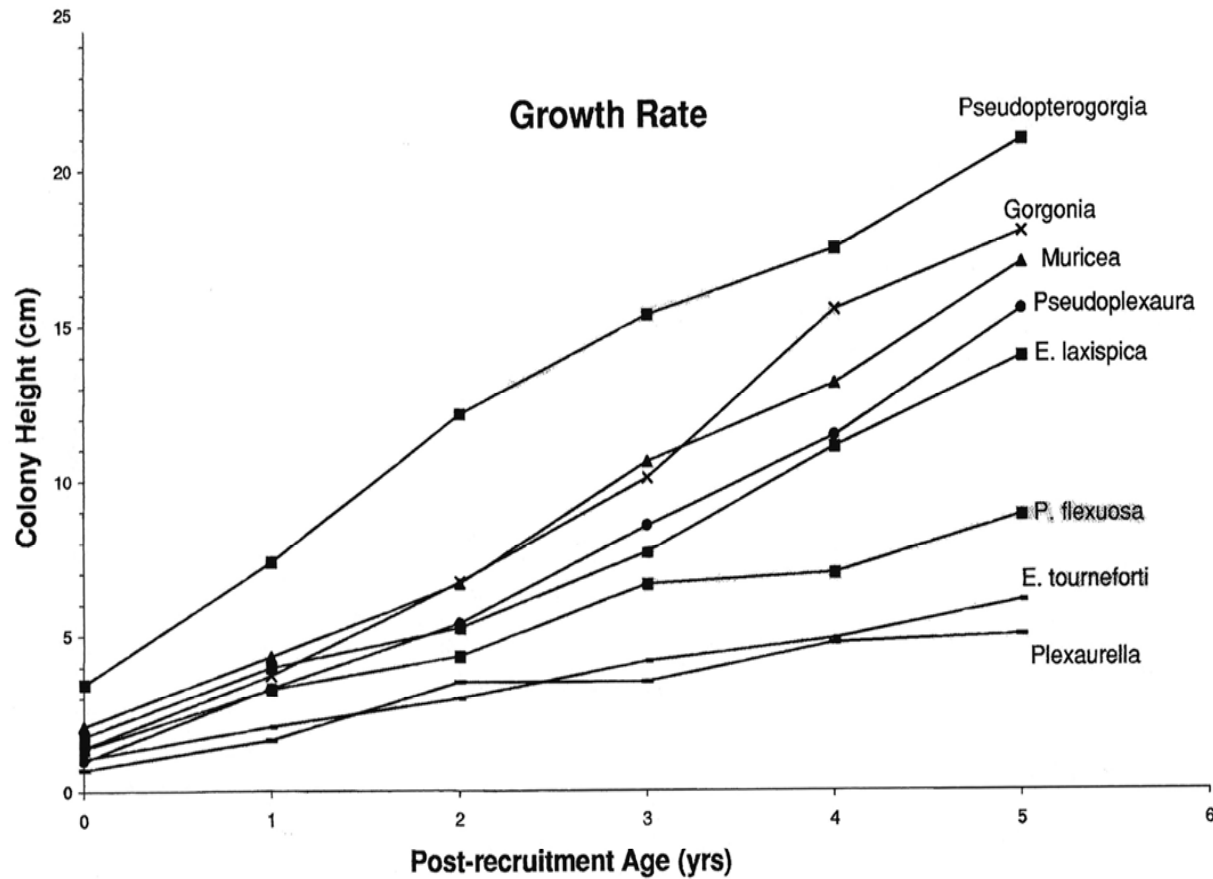
Plexaura flexuosa

Thick branched

Eunicea tourneforti

Plexaurella spp.

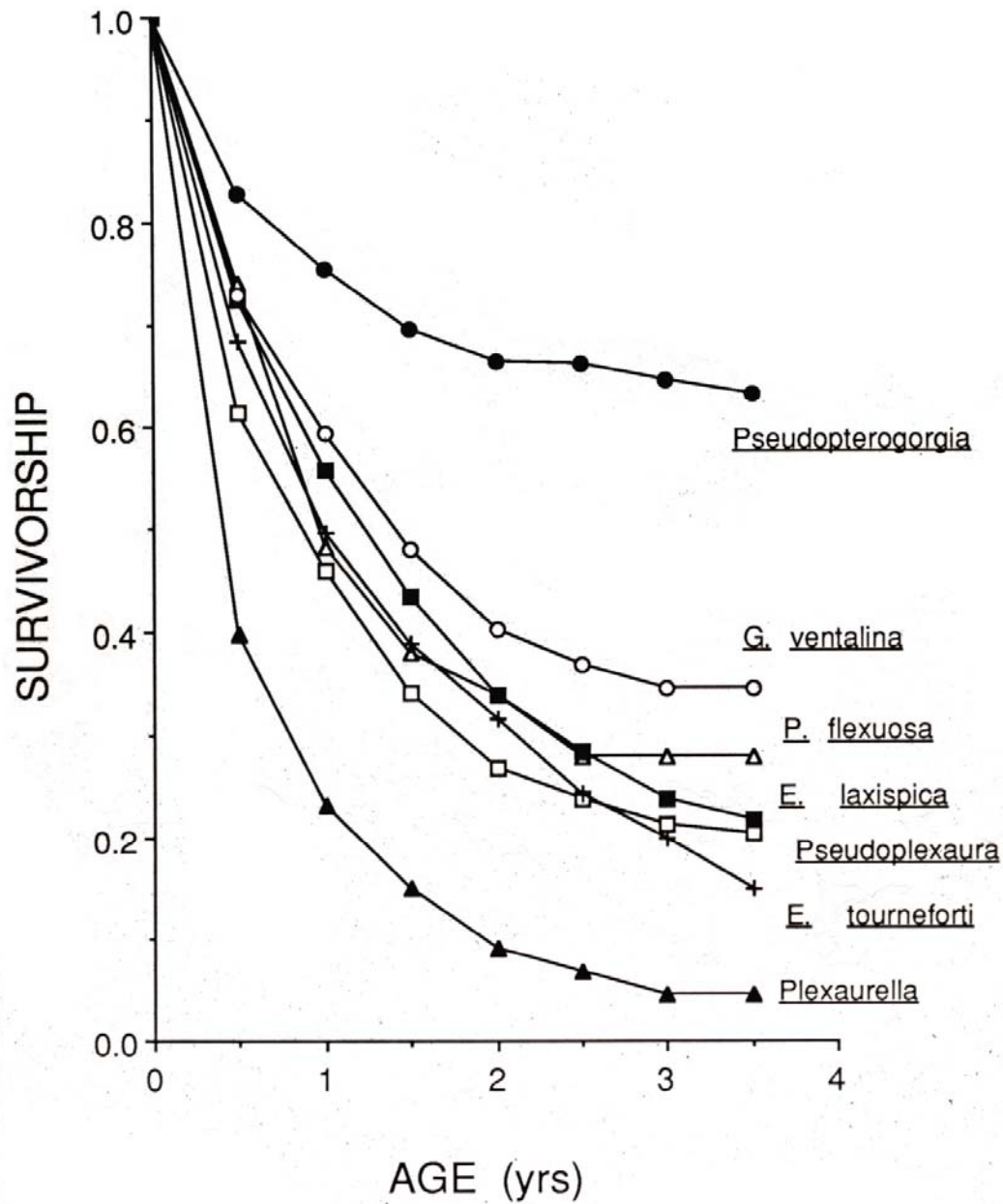




Thin-
branched



Thick-
branched

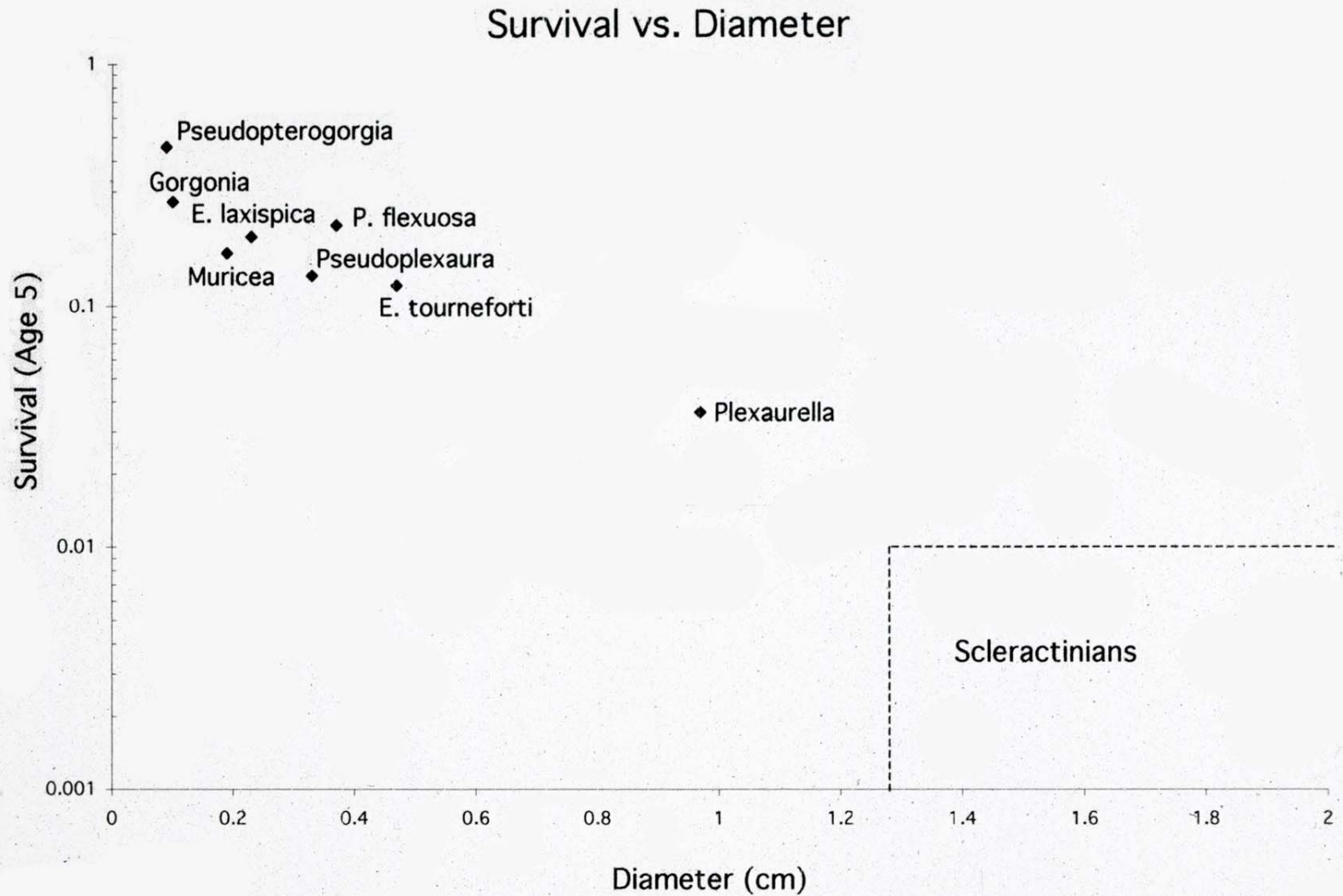


Thin branched



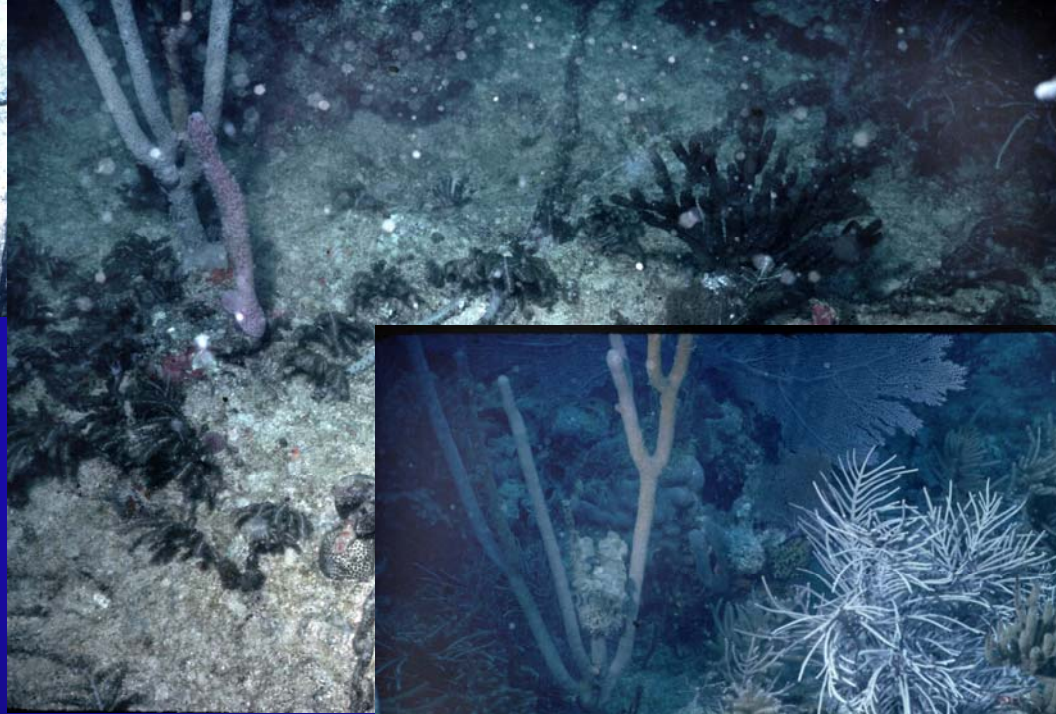
Thick Branched

Thin branched \longrightarrow Thick branched





Pre-1984



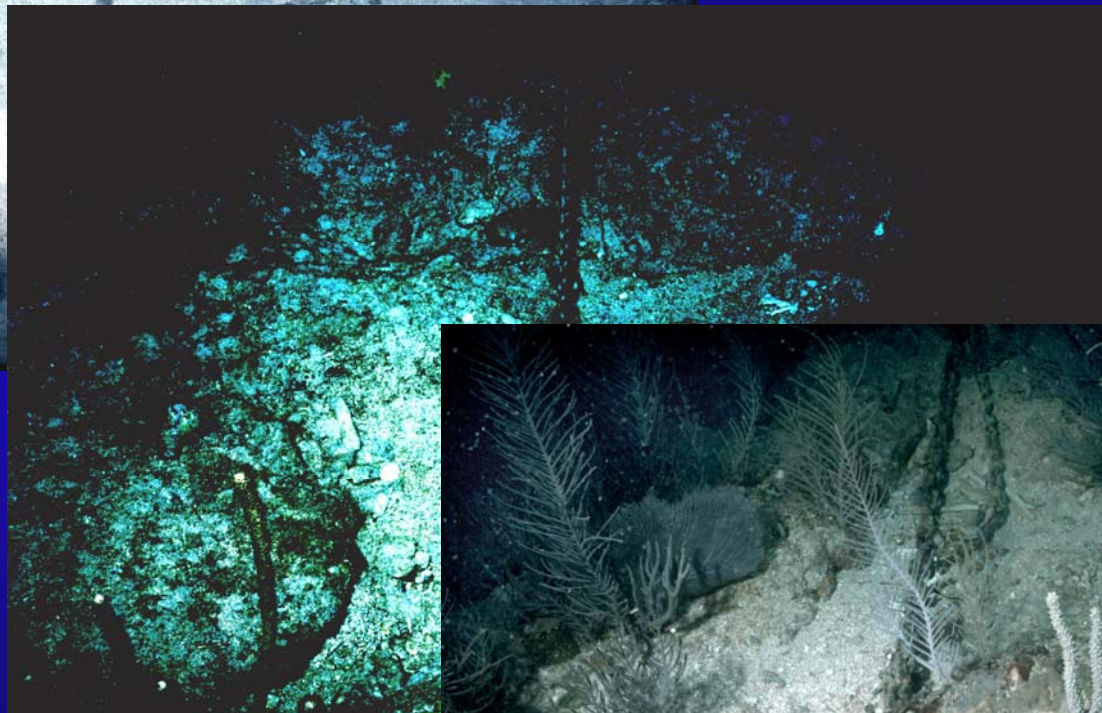
1984-1986



Post-1986



Pre-1984



1984-1986



Post-1986

PREDICTIONS (MECHANISM)

DIADEMA PRE-TRANSPLANT:

Low recruitment (High bedload: consolidated sediments)

DIADEMA TRANSPLANT:

Low recruitment (High bedload: bioerosion)

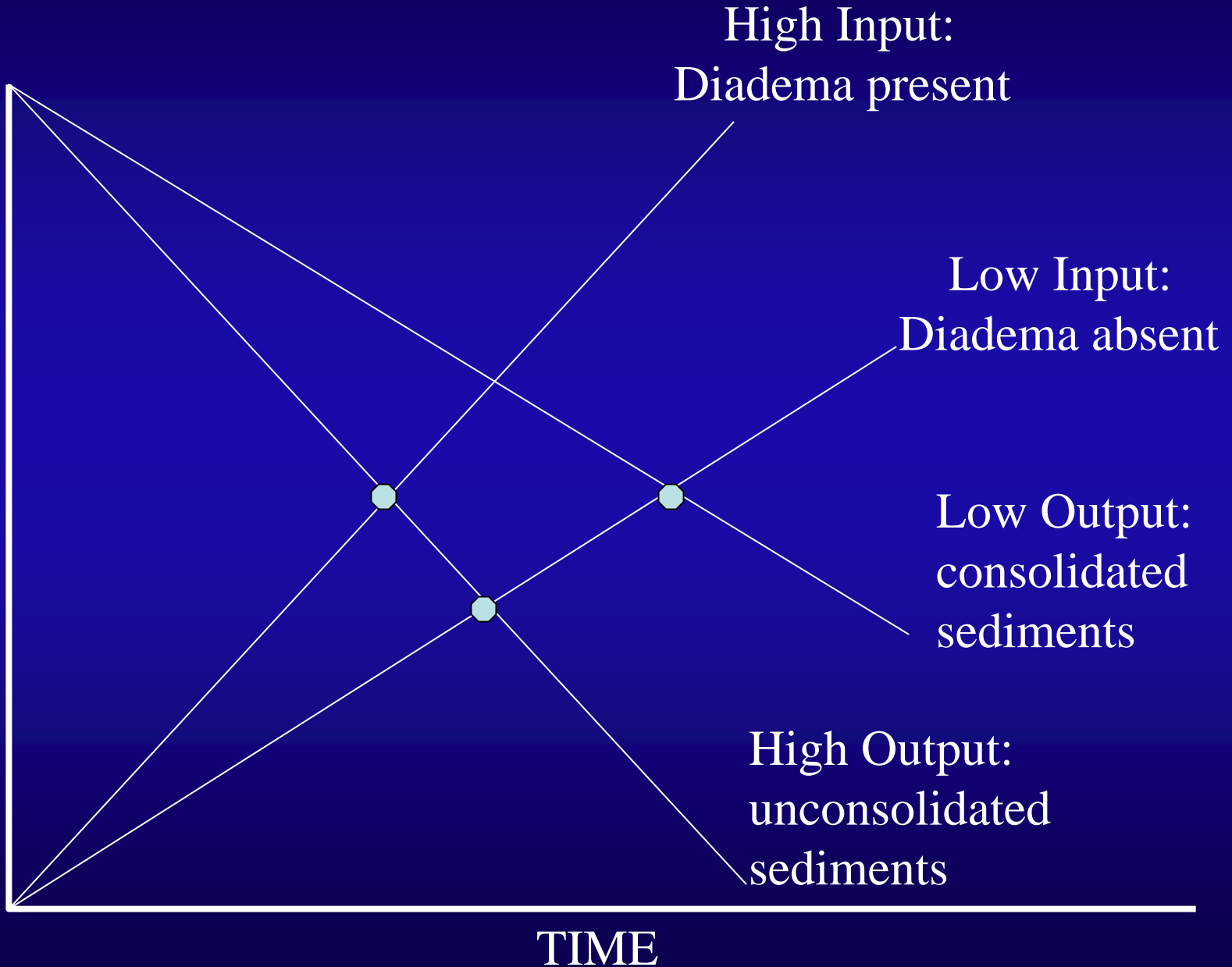
DIADEMA REMOVAL (EARLY)

High recruitment (Low bedload: transport of
clean sediments)

DIADEMA REMOVAL (LATE)

Low recruitment (High bedload: consolidated sediments)

BED LOAD THICKNESS



PROJECT STATUS

Site selection: Media Luna Reef (2 sites)

Baseline (pre-transplant) surveys of biota

- Gorgonians: April 2004, December 2004 with E. McLean and E. Rodriguez

Pre-transplant monitoring surveys

- Gorgonians: September 2004 (1 site)

Diadema caging experiments (E. Rodriguez)